Can Individual Investors Time Bubbles?

Jussi Keppo, Tyler Shumway and Daniel Weagley

NUS Business School, University of Michigan and Georgia Institute of Technology

September 25, 2015 - 2015 Household Economics and Decision-Making Conference

Individual Investors

- There is a growing literature about how individuals behave
- They have lots of problems
  - Trade too much
  - Hold loser stocks too long, sell winners
  - Buy stocks in the news
- Some have skill
  - Performance persistence in picking stocks
  - Learn by trading
- We ask whether any can consistently time the market
- We use 14.5 years of Finnish individual investor data

Market Timing

- Stock picking: choosing stocks that outperform the market
  - Measured with alpha
- Market timing: increasing exposure (or beta) before the market rises
  - Measured with correlation of stock share and market return
  - Does not consider which stocks investors buy
- Performance persistence: consistency in performance across time, so previously successful investors remain successful
- We test for performance persistence in market timing ability

Why Do We Care?

- Efficient Market Hypothesis
- Predictability of market returns
  - Shiller (1984), Cochrane (2008), Campbell and Shiller (1988)
  - Stambaugh (1986) and Goyal and Welch (2008)
- Bubbles literature
- Market efficiency vs investor skill
- Advice for market participants

Our Prior

- In aggregate, investors appear unable to time the market
  - Investor returns are lower than buy-and-hold returns for almost all major stock markets (Dichev, 2007)
- Some sophisticated participants appear able to time the market
  - Mutual fund managers have some ability to time the market, especially in recessions (Kacperczyk, Van Nieuwerburgh and Veldkamp, 2012)
  - Firms market time when issuing securities (Baker and Wurgler, 2000)
- Some other researchers find some evidence for timing (Che Norli and Priestly, 2012, Grinblatt, Keloharju and Linnainmaa, 2012)
- It seems unlikely that people can have good private information about future returns of the market, so our prior (and null) is no timing

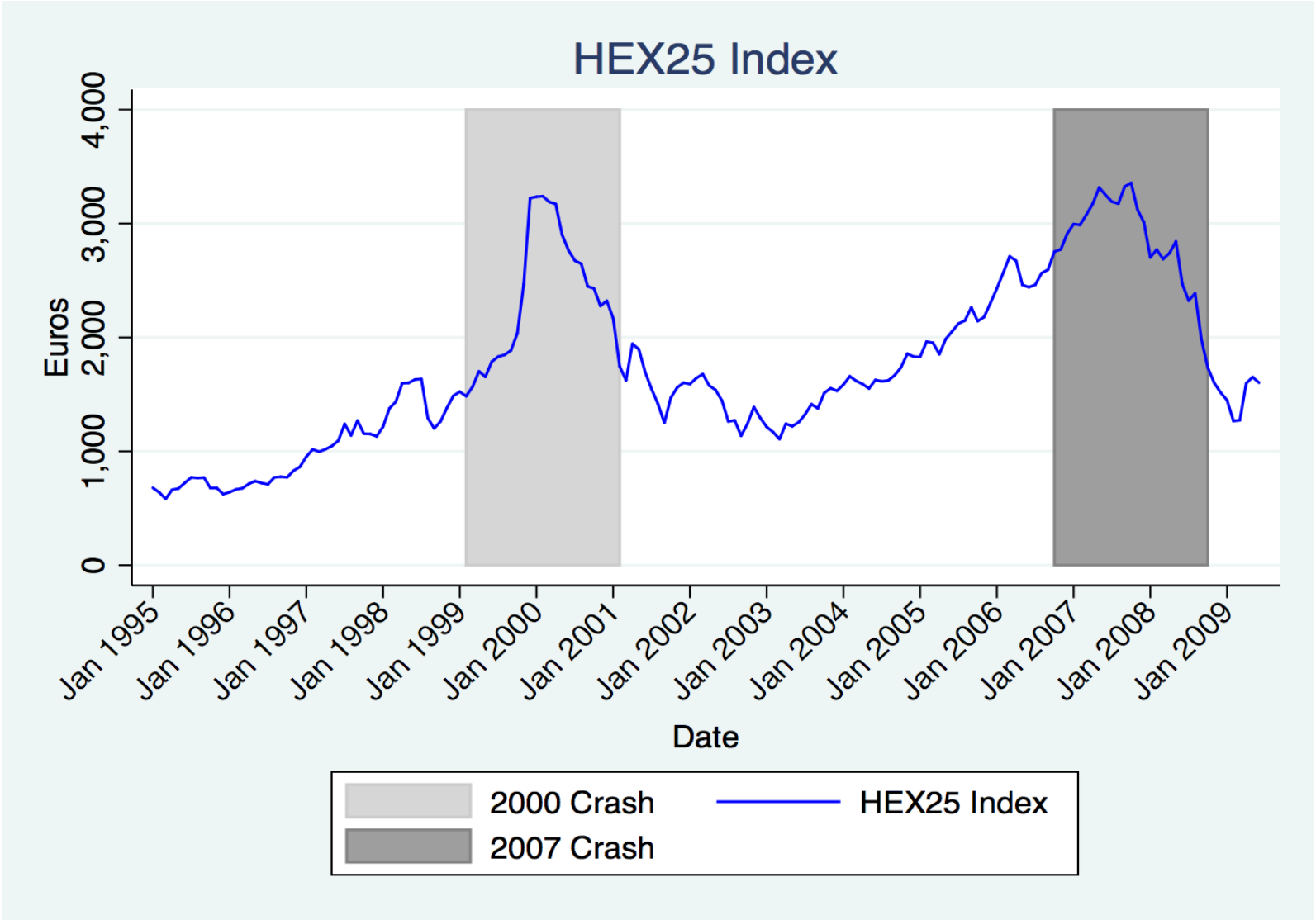
Findings

- We find evidence that some people can time the market
- Previously successful timers can expect to outperform
- Some are consistently bad at timing
- Timing occurs at short and long horizons
- Observing timers may help policy makers anticipate crashes

Research Design

- We examine trades made by Finnish individual investors on the Helsinki stock exchange between January 1995 and June 2009
- Divide the sample into two equal length periods:
  - January 1995 - March 2002
    - 1990's dot com run-up and crash (or bubble)
  - April 2002 to June 2009
    - 2000's housing run-up and crash (or bubble)
- We create measures of market timing using investor flows and subsequent market returns for each sub-period
- Examine persistence in investors' ability to time market movements across the two periods

HEX25 Over the Sample Period



Data

- Investor trades from the Helsinki Stock Exchange
  - Calculate monthly portfolio flows by investor
  - Never observe full portfolio or total wealth
  - Very rich data in some ways, but not perfect
  - Contain some information about characteristics
  - Zip-code level demographic data also available
- HEX25 returns from Bloomberg

Summary Statistics of Investor Monthly Flows

Year	# Trades	# Flows	Mean	Std. Dev.	Flow<0	Flow$=0$	Flow>0
1995	1,106,131	5,989,419	-4.44	6,932.47	1.48%	92.95%	5.57%
1996	1,653,754	6,270,538	-147.83	10,421.84	3.00%	95.22%	1.78%
1997	1,045,212	6,611,850	12.72	17,922.49	2.15%	93.08%	4.76%
1998	1,636,010	8,187,194	15.60	18,390.69	2.43%	92.44%	5.13%
1999	3,184,759	10,110,636	139.71	76,550.73	3.90%	88.46%	7.63%
2000	4,197,161	11,945,160	-308.52	62,920.32	4.81%	89.26%	5.93%
2001	3,024,283	13,099,352	54.30	21,880.88	2.32%	93.73%	3.95%
2002	2,424,148	13,515,142	-30.12	63,610.97	2.99%	94.80%	2.22%
2003	2,085,023	13,876,734	67.85	589,711.60	1.50%	95.81%	2.70%
2004	3,026,864	14,212,349	136.34	85,171.38	1.76%	94.87%	3.38%
2005	3,472,769	14,455,703	-80.24	55,313.11	3.10%	94.25%	2.65%
2006	3,607,899	14,719,870	-144.70	112,676.70	2.14%	95.56%	2.30%
2007	4,575,925	15,158,231	-54.16	41,974.89	2.09%	95.81%	2.10%
2008	4,679,523	15,706,092	122.51	20,921.38	1.00%	96.48%	2.52%
2009*	3,510,097	8,198,472	114.37	10,335.64	1.75%	92.85%	5.40%

Measuring Timing

- We would like to measure stock share over time
- No wealth, incomplete portfolio data make that difficult
- People vary their funds at risk substantially
- We thought about various measures, deciding to use correlations of flows with cash returns in the end
- Since we are measuring correlations for individuals, wealth drops out in a sense
- Analogous to using volatility of flows as wealth proxy

Short- and Medium-Horizon Timing Measures

- Short-Horizon Measure: Correlation($Flow_t$, $MonthReturn_{t+1}$)
  - $Flow_t$ is the investor's cash inflow/outflow in month t
  - $MonthReturn_{t+1}$ is the cash return on the HEX25 in month t+1
- Medium-Horizon Measure: Correlation($Flow_t$, $QuarterReturn_{t+1}$)
  - $Flow_t$ is the investor's cash inflow/outflow in month t
  - $QuarterReturn_{t+1}$ is the cash return on the HEX25 in the quarter starting in month t+1
- Each measure is calculated over 87 months of flows for each sub-period

Summary Statistics of Monthly and Quarterly Timing Measures

Time Period	Flow Freq.	Return Freq.	Mean	Std. Dev.	25th	Median	75th	N
Monthly Timing Measure:								
Entire Period								
1995-2002	Monthly	Monthly	0.03	0.18	-0.07	0.01	0.13	70,396
2002-2009	Monthly	Monthly	0.00	0.10	-0.06	0.00	0.07	68,243
Bubble Period								
2000 Bubble	Monthly	Monthly	0.04	0.25	-0.12	0.01	0.20	70,252
2007 Bubble	Monthly	Monthly	-0.03	0.18	-0.15	-0.04	0.10	52,461
Normal Times								
1995-2002	Monthly	Monthly	0.02	0.18	-0.08	0.02	0.11	68,739
2002-2009	Monthly	Monthly	0.02	0.13	-0.07	0.02	0.11	67,058
Quarterly Timing Measure:								
Entire Period								
1995-2002	Monthly	Quarterly	0.02	0.13	-0.07	0.02	0.10	70,396
2002-2009	Monthly	Quarterly	0.01	0.10	-0.06	0.00	0.07	68,243
Bubble Period								
2000 Bubble	Monthly	Monthly	0.02	0.19	-0.11	0.02	0.14	70,252
2007 Bubble	Monthly	Monthly	-0.03	0.19	-0.18	-0.04	0.11	52,461
Normal Times								
1995-2002	Monthly	Monthly	0.02	0.17	-0.09	0.01	0.12	74,069
2002-2009	Monthly	Monthly	0.04	0.14	-0.06	0.03	0.13	70,183

Two Period Cross-Tab of the Entire Period Monthly Timing Measure

	Second Period					
First Period	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Total**
Q1	24.38%***	20.55%	19.27%**	18.48%***	17.32%***	100%
Q2	20.27%	20.24%	20.02%	19.93%	19.54%*	100%
Q3	19.23%**	20.35%	20.67%**	19.97%	19.78%	100%
Q4	18.82%***	20.01%	20.25%	20.20%	20.72%**	100%
Q5	17.25%***	18.85%***	19.81%	21.43%***	22.67%***	100%
Total	20.00%	20.00%	20.00%	20.00%	20.0 0%	100%

*** p<0.01, ** p<0.05, * p<0.1. Null: Cell%=20%.

The pairwise correlation between the first and second period monthly timing measures is .0727 and is significant at the .0001% level.

Two Period Cross-Tab of the "Bubble Period" Monthly Timing Measure

	2007 Bubble					
2000 Bubble	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Total**
Q1	22.06%***	19.09%*	20.04%	19.05%	19.76%	100%
Q2	20.02%	19.11%*	20.28%	20.55%***	20.03%	100%
Q3	19.98%	20.33%	19.52%	20.30%**	19.87%	100%
Q4	19.49%	19.41%	20.58%**	20.52%**	20.01%	100%
Q5	18.40%***	19.77%	20.17%	21.32%***	20.33%	100%
Total	20.00%	20.00%	20.00%	20.00%	20.0 0%	100%

*** p<0.01, ** p<0.05, * p<0.1. Null: Cell%=20%

The pairwise correlation between the first and second period monthly timing measures is .0241 and is significant at the .0001% level.

Two Period Cross-Tab of the "Normal Times" Monthly Timing Measure

	Second Period					
First Period	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Total**
Q1	18.76%***	20.14%	20.41%*	20.52%*	20.18%	100%
Q2	21.00%***	19.73%	20.95%***	19.42%*	18.90%***	100%
Q3	22.78%***	20.60%**	19.04%***	19.37%*	18.22%***	100%
Q4	20.40%	20.27%	19.46%*	19.74%	20.14%	100%
Q5	17.13%***	19.29%**	20.11%	20.94%***	22.54%***	100%
Total	20.00%	20.00%	20.00%	20.00%	20.0 0%	100%

*** p<0.01, ** p<0.05, * p<0.1. Null: Cell%=20%

The pairwise correlation between the first and second period monthly timing measures is .0229 and is significant at the .0001% level.

Two Period Cross-Tab of Significant Outflows around the Market Peak

	2007 Bubble					
2000 Bubble	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Total**
Q1	20.20%	21.18%***	18.94%***	21.62%***	18.05%***	100%
Q2	20.18%	20.43%	20.30%	20.14%	18.95%***	100%
Q3	19.70%*	20.01%	20.71%**	19.31%	20.27%	100%
Q4	20.29%	19.73%	20.78%**	18.93%***	20.27%	100%
Q5	19.62%	18.66%***	19.28%**	20.00%**	22.44%***	100%
Total	20.00%	20.00%	20.00%	20.00%	20.00%	100%

*** p<0.01, ** p<0.05, * p<0.1. Null: Cell%=20%

The pairwise correlation between the first and second period monthly timing measures is .0117 and is significant at the .3% level.

Correlations Between Timing Measures

Panel A: First Period Measures			
	Bubble-Monthly	**Normal-Monthly**	**Bubble-Quarterly**
Normal-Monthly	0.0266	-	
	0.0000	-	
Bubble-Quarterly	0.7412	0.0266	-
	0.0000	0.0000	-
Normal-Quarterly	0.0214	0.5915	0.0313
	0.0000	0.0000	0.0000

Panel B: Second Period Measures			
	Bubble-Monthly	**Normal-Monthly**	**Bubble-Quarterly**
Normal-Monthly	0.0367	-	
	0.0000	-	
Bubble-Quarterly	0.6798	0.0332	-
	0.0000	0.0000	-
Normal-Quarterly	-0.0017	0.6122	-0.0133
	0.7499	0.0000	0.0141

Aggregate Second Half Performance Measures

- Next, we aggregate investor flows by first period group ranking and examine group performance in the second half
- For each investor, we standardize their flows using their mean flow and the standard deviation
- For each group-month, we sum the standardized flows across all investors in the group. We then again standardize these group flows.
- The Average Flow-Weighted Return is the average for group j of $WeightReturn_{jt}$, which is calculated as follows:

$$WeightReturn_{jt} = Flow_{jt} * Return_{t+1}$$

where $Return_{t+1}$ is the return on the HEX25 during month t+1 and $Flow_{jt}$ is the flow in month t of group j.
- The Flow-Weighted Return-Volatility Ratio is the average Flow-Weighted Return divided by the standard deviation of the flow-weighted return.

Second Half Performance

Timing	Q1	Q2	Q3	Q4	Q5	Top 20%-Bot. 20%	Passive
Panel A: Average Flow-Weighted Return							
Monthly	7.38	3.91	3.02	1.79	-2.72	10.09	3.91
Quarterly	7.00	5.21	3.73	0.92	-2.29	9.29	3.91
Normal-Monthly	2.48	5.41	7.45	4.27	-1.07	3.56	3.91
Normal-Quarterly	6.51	4.92	5.31	2.38	-0.75	7.26	3.91
Bubble-Monthly	6.26	2.28	1.48	0.73	-2.21	8.47	3.91
Bubble-Quarterly	4.95	3.29	1.90	1.15	-1.46	6.41	3.91
Panel B: Flow-Weighted Return-Volatility Ratio							
Monthly	.09	.05	.04	.02	-.03	.26	.05
Quarterly	.09	.06	.04	.01	-.03	.28	.05
Normal-Monthly	.03	.07	.08	.05	-.01	.23	.05
Normal-Quarterly	.08	.06	.06	.03	-.01	.23	.05
Bubble-Monthly	.08	.03	.02	.01	-.03	.26	.05
Bubble-Quarterly	.06	.04	.02	.01	-.02	.26	.05

Market Return Predictability

VARIABLES	(1) HEX25	(2) HEX25	(3) HEX25	(4) HEX25	(5) HEX25	(6) HEX25	(7) HEX25	(8) HEX25
Top 20-Bottom 20	0.0150**							0.0161**
	(0.00686)							(0.00750)
Top 20 Flow		0.00628						
		(0.00702)						
Bottom 20 Flow			-0.00231					
			(0.00705)					
Log(EP ratio)				-0.0337			-0.0270	-0.0461
				(0.0256)			(0.0277)	(0.0285)
Log(Div. Yield)					-0.0149		0.0120	0.0138
					(0.0277)		(0.0306)	(0.0300)
HEX25 t-1						0.200*	0.188	0.0998
						(0.107)	(0.115)	(0.120)
Observations	87	87	87	87	87	87	87	87
R-squared	0.053	0.009	0.001	0.020	0.003	0.040	0.050	0.101

Standard Errors in Parentheses
*** p<0.01 ** p<0.05 * p<0.1

Predicting Market Crashes

- Can investors predict market crashes?
- We have two market peaks and crashes in our sample
  - February 2000 peak
  - October 2007 peak

Predicting Negative Returns With Investor Flows

Timing Measure	P(Bear Mkt)	P(Sell)	P(Sell |Bear Mkt)	**P(Bear Mkt |Sell)**
Monthly	24.1%	11.5%	19.0%	**40.5%**
Quarterly	24.1%	12.6%	19.0%	**36.8%**
Normal-Monthly	24.1%	16.1%	19.0%	**28.9%**
Normal-Quarterly	24.1%	13.8%	19.0%	**33.7%**
Bubble-Monthly	24.1%	10.3%	14.3%	**33.7%**
Bubble-Quarterly	24.1%	12.6%	14.3%	**27.6%**

A "bear" market defined as a monthly return at least half of one standard deviation below the mean return (-2.9%).

Investor Characteristic Regressions

VARIABLES	(1) Top 20	(2) Bottom 20	(3) Timing Skill
Male	0.0254*	0.00233	0.0212
	(0.0138)	(0.0139)	(0.0132)
Age 25-45	0.00810	0.0186	-0.00924
	(0.0199)	(0.0196)	(0.0192)
Age 46-64	0.0559***	-0.0573***	0.0714***
	(0.0202)	(0.0202)	(0.0196)
Age 65+	-0.0704***	-0.0822***	-0.00215
	(0.0270)	(0.0270)	(0.0254)
Density	0.182	-0.520*	0.230
	(0.285)	(0.283)	(0.268)
University %	-0.00298***	5.73e-05	-0.00185***
	(0.000650)	(0.000639)	(0.000611)
Finance %	-0.000721	-0.000152	-0.000826
	(0.00204)	(0.00202)	(0.00191)
Finnish	0.0517***	0.0163	-0.00499
	(0.0197)	(0.0192)	(0.0182)

Investor Characteristic Regressions Continued

VARIABLES	(1) Top 20	(2) Bottom 20	(3) Timing Skill
Option	0.235***	-0.0602***	0.158***
	(0.0262)	(0.0230)	(0.0231)
OMX ETF	-0.0754*	0.0421	-0.0931**
	(0.0453)	(0.0419)	(0.0415)
Nokia Flow %	-0.426***	0.399***	-0.560***
	(0.0309)	(0.0293)	(0.0285)
Avg. Beta	0.777***	0.225***	0.346***
	(0.0322)	(0.0319)	(0.0308)
Log(Trades)	-0.311***	0.213***	-0.311***
	(0.0109)	(0.00963)	(0.00955)
Log(Flow Size)	-0.117***	-0.0592***	-0.0252***
	(0.00699)	(0.00663)	(0.00638)
Log(Securities)	0.352***	-0.240***	0.374***
	(0.0176)	(0.0164)	(0.0160)
Observations	64,179	64,179	64,179
R-squared			0.034

Standard Errors in Parentheses
*** p<0.01 ** p<0.05 * p<0.1

Two Period Cross-Tab of the Monthly Timing Measure - Nokia Returns

	Second Period					
First Period	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Total**
Q1	24.39%***	19.71%	18.88%***	19.11%***	17.91%***	100%
Q2	20.44%	20.27%	19.65%	20.00%	19.63%	100%
Q3	19.48%*	19.63%	20.60%*	19.85%	20.44%	100%
Q4	18.63%***	20.10%	20.67%**	19.79%	20.82%***	100%
Q5	17.05%***	20.29%	20.21%	21.24%***	21.21%***	100%
Total	20.00%	20.00%	20.00%	20.00%	20.0 0%	100%

*** p<0.01, ** p<0.05, * p<0.1. Null: Cell%=20%.

The pairwise correlation between the first and second period monthly timing measures is .0666 and is significant at the .0000 level.

Two Period Cross-Tab of the Monthly Timing Measure - Omitting Nokia Flows and Returns

	Second Period					
First Period	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Total**
Q1	22.78%***	21.51%***	19.03%***	18.86%***	17.81%***	100%
Q2	20.38%	19.98%	20.47%	19.55%	19.62%	100%
Q3	20.28%	20.26%	19.93%	20.38%	19.15%***	100%
Q4	19.08%***	19.25%**	20.80%***	20.19%	20.68%**	100%
Q5	17.44%***	18.97%***	19.80%	21.04%***	22.75%***	100%
Total	20.00%	20.00%	20.00%	20.00%	20.0 0%	100%

*** p<0.01, ** p<0.05, * p<0.1. Null: Cell%=20%.

The pairwise correlation between the first and second period monthly timing measures is .0602 and is significant at the .0000 level.

Two Period Cross-Tab of the Monthly Timing Measure - Adjusted for Autocorrelation

	Second Period					
First Period	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Total**
Q1	24.07%***	20.54%*	19.35%**	18.76%***	17.28%***	100%
Q2	20.56%*	20.29%	20.10%	19.36%**	19.69%	100%
Q3	19.25%**	20.50%	20.40%	19.88%	19.98%	100%
Q4	18.73%***	19.74%	20.27%	20.58%**	20.68%**	100%
Q5	17.36%***	18.94%***	19.88%	21.43%***	22.39%***	100%
Total	20.00%	20.00%	20.00%	20.00%	20.0 0%	100%

*** p<0.01, ** p<0.05, * p<0.1. Null: Cell%=20%.

The pairwise correlation between the first and second period monthly timing measures is .0685 and is significant at the .0000 level.

Two Period Cross-Tab of the Entire Period Monthly *Beta-Adjusted* Timing Measure

	Second Period					
First Period	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Total**
Q1	25.06%***	20.50%	18.88%***	18.59%***	16.97%***	100%
Q2	19.88%	20.49%	20.09%	19.92%	19.61%	100%
Q3	19.14%***	20.32%	20.38%	20.02%	20.14%	100%
Q4	18.70%***	19.38%**	20.37%	20.51%*	21.05%***	100%
Q5	17.17%***	19.32%**	20.29%	20.97%***	22.25%***	100%
Total	20.00%	20.00%	20.00%	20.00%	20.0 0%	100%

*** p<0.01, ** p<0.05, * p<0.1. Null: Cell%=20%.

The pairwise correlation between the first and second period monthly timing measures is .0752 and is significant at the .0001% level.

Conclusion

- Appears to be persistence in investor timing ability across time horizons
- Evidence of market return predictability
- Variation in individual investor skill, some individual investors can time the market while some consistently mistime the market